

REMARKS

In the last Office Action, claims 1, 2, 7-9, 120-122 and 134-141 were rejected under 35 U.S.C. §103(a) as being unpatentable over Brezoczky (EPA 0-549-236 A2). Claims 131-133 and 142-143 were objected to as being dependent upon a rejected base claim, but indicated to be allowable if rewritten in independent form including all of the limitations of the base and any intervening claims.

Applicants and applicants' counsel note with appreciation the indication of allowable subject matter concerning claims 131-133 and 142-143. However, for the reasons noted below, applicants respectfully submit that amended independent claims 1 and 134 and corresponding dependent claims 7-9, 120-122, 134, 136-141 also patentably distinguish from the prior art of record.

In accordance with the present response, independent claims 1 and 134 has been amended only to incorporate the subject matter of dependent claims 2 and 135, respectively, which have been canceled. By the foregoing amendments, claims 1, 7-9, 120-122, 131-134 and 136-143 are currently pending in this application.

Applicants respectfully traverse the Section 103 rejection of claims 1, 7-9, 120-122, 134, 136-141 and claims 2, 135 (now the subject matter of independent claims 1 and 134, respectively) and request reconsideration of their application in light of the foregoing amendments and the following discussion.

The present invention relates to a near-field optical head. With reference to the embodiments shown in Figs. 5 and 11, the near-field optical head 500 comprises a planar substrate 501 having a first surface, a second surface opposite the first surface, and an inverted conical or pyramidal hole 507 having a fine aperture at an apex thereof and extending through the first and second surfaces. As shown in Fig. 11, the inverted conical or pyramidal hole has at least one curved slant surface 1102. An optical waveguide 504 extend into the inverted conical or pyramidal hole 507 of the planar substrate 501 for propagating light along an optical path. A mirror 508 is disposed in the optical waveguide 504 for bending in the direction of the fine aperture the optical path of the light propagated through the optical waveguide 504.

By the foregoing construction, the provision of the inverted conical or pyramidal hole of the near-field optical head with a curved slant surface prevents the reduction in strength of near-field light produced from the fine aperture

at the apex of the inverted conical or pyramidal hole. Accordingly, the light propagating efficiency of the near-field optical head is improved and a stronger near-field light is achieved, thereby resulting in more precise recording on a recording medium.

Furthermore, the provision of an optical waveguide that extends into the inverted conical or pyramidal hole of the planar substrate increases the overall propagation efficiency and strength of the near-field light because the optical waveguide is able to propagate light that is guided in a parallel direction relative to a planar surface of a recording medium up to the vicinity of the fine aperture of the inverted conical or pyramidal hole. As a result, additional focusing elements are not required, thereby facilitating a reduction in the overall size of the near-field optical head. Furthermore, a spot diameter of the near-field light becomes smaller and the optical strength of the near-field light is increased because the near-field optical head achieves a shorter floating distance from the recording medium. Accordingly, a higher recording density is achieved as compared to the conventional art.

Moreover, the foregoing advantages achieved by the structure of the near-field optical head of the invention embodied in the claims is in contrast to conventional near-field optical heads which do not provide an optical waveguide

that extends into an inverted conical or pyramidal hole of a planar substrate and a conical or pyramidal hole with a plurality of non-curved slant surfaces which suffer from flashing of propagating light at apexes between the non-curved slant surfaces that causes a decline of the near-field light produced at the fine aperture of the inverted conical or pyramidal hole. Moreover, leaking of the propagating light at the apexes results in recording on a part of a recording medium that is not intended to be recorded. As a result, the light propagating efficiency of the near-field optical head is poor and recording cannot be carried out with precision.

Applicants respectfully submit that Brezoczky does not render obvious the invention recited in amended independent claims 1 and 134 and corresponding dependent claims 7-9, 120-122, 134, 136-141.

Brezoczky discloses an optical head comprising a planar substrate (i.e., slider) 31 (Fig. 3) or 51 (Figs. 4-5) having a cone-shaped aperture or hole 35. As recognized by the Examiner, the cone-shaped aperture or hole 35 in Brezoczky does not have at least one curved slant surface. Thus, the optical head of Brezoczky suffers from the disadvantages as set forth above for conventional near-field optical heads.

In contrast, independent claim 1 recites a planar substrate having a first surface, a second surface disposed opposite to the first surface, and an inverted conical or

pyramidal hole extending through the first and second surfaces, the inverted conical or pyramidal hole having at least one fine aperture formed at an apex thereof and disposed in the first surface and having at least one curved slant surface. Likewise, independent claim 134 requires a substrate having an inverted conical or pyramidal hole penetrating therethrough, the hole being formed by at least one curved slant surface and having at least one fine aperture at an apex thereof.

With respect to the foregoing feature recited in each of independent claims 1 and 134, the Examiner has taken official notice that an "inverted conical or pyramidal hole having at least one curved slant surface" is "old and widely used in the optical recording art". Applicants respectfully disagree with the Examiner's reliance on only officially noticed facts to support the conclusion that it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a near-field optical head with an inverted conical or pyramidal hole having at least one curved slant surface, as required by independent claims 1 and 134.

Applicants respectfully submit that officially noticed facts may only play a minor role in filling evidentiary gaps to support a conclusion of obviousness and cannot provide the totality of evidence to support an

obviousness rejection. In re Ahlert, 165 USPQ 418, 421 (CCPA 1970). See, also, In re Kaplan, 229 USPQ 678, 683 (Fed. Cir. 1986) ("Even if obviousness of the variation is predicated on the level of skill in the art, prior art evidence is needed to show what that level of skill was.").

In this case, the Examiner has failed to establish a recognition in the prior art, and thus knowledge thereof, of a near-field optical head with an inverted conical or pyramidal hole having at least one curved slant surface, as required by independent claims 1 and 134. While recognizing that it is known to provide an inverted cone-shaped hole with slant surfaces having different degrees of slant, applicants respectfully submit that this knowledge does not render obvious the provision of an inverted conical or pyramidal hole with at least one curved slant surface, as recited in independent claims 1 and 134. There is nothing in Brezoczky that would suggest providing the cone-shaped aperture or hole 35 with at least one curved slant surface.

Thus the Examiner cannot properly rely on a conclusion of obviousness solely on official notice to modify Brezoczky to achieve a near-field optical head with an inverted conical or pyramidal hole having at least one curved slant surface, as required by independent claims 1 and 134. The only basis for such modification urged by the Examiner in the rejection is applicants' own disclosure, and such

hindsighted rejections are improper. See, for example, Diversitech Corp. v. Century Steps, Inc., 7 USPQ2d 1315, 1318 (Fed. Cir. 1988); In re Geiger, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); Panduit Corp. v. Dennison Manufacturing Co., 227 USPQ 337, 343 (Fed. Cir. 1985); Interconnect Planning Corp. v. Feil, 227 USPQ 543, 551 (Fed. Cir. 1985).

Moreover, independent claims 1 and 134 have been amended to incorporate the subject matter of dependent claims 2 and 135, respectively. Thus, each of amended independent claims 1 and 134 requires an optical waveguide extending into the inverted conical or pyramidal hole of the planar substrate for propagating light along an optical path. No corresponding feature is disclosed or suggested by Brezoczky.

With respect to the foregoing feature recited in claims 2 and 135, now the subject matter of independent claims 1 and 134, respectively, the Examiner contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made "to extend the waveguide" (i.e., element denoted by reference numerals 46, 49, 61, 76 in Fig. 5 of Brezoczky) into a conical hole of Brezoczky because "the waveguide for guiding a light beam, such as, optical fiber, could be...formed at any suitable locations on the optical head." Applicants respectfully disagree with the Examiner's contention and conclusion of obviousness to arrive at the claimed invention.

A claim rejection based upon obviousness must be supported by evidence establishing the obviousness of each and every limitation of a rejected claim. This requires the citation of references which directly establish a lack of novelty or a cogent line of reasoning consistent with and motivated by the cited art establishing that such limitations would have been obvious. There must be some teaching, reason, suggestion, or motivation found in the prior art to make a combination or modification which renders an invention obvious within the meaning of 35 U.S.C §103. See, e.g., Symbol Technologies, Inc. v. Opticon, Inc., 935 F.2d 982, 989, 18 USPQ2d 1885 (Fed. Cir. 1991). Such a teaching is missing in the prior art of record since in Brezoczky, the component denoted by reference numeral 49, which forms part of the optical waveguide, corresponds to a suspension arm from which the optical slider 51 is suspended (col. 7, lines 12-13), and such suspension arm does not extend into an inverted conical or pyramidal hole of the optical head. In this regard, it is unclear from the statement of rejection how the Examiner proposes to modify Brezoczky's optical head such that the optical waveguide, which includes the suspension arm 49, would extend into an inverted conical or pyramidal hole of the optical head. Thus, Brezoczky teaches only some of the limitations of the claims and omits fundamental aspects of the claimed invention discussed above, including an optical

waveguide extending into the inverted conical or pyramidal hole of the planar substrate for propagating light along an optical path, as recited in amended independent claims 1 and 134.

Claims 7-9, 120-122 and 136-141 depend on and contain all of the limitations of amended independent claims 1 and 134, respectively, and, therefore, distinguish from Brezoczky at least in the same manner as set forth above for amended claims 1 and 134.

In view of the foregoing, applicants respectfully request that the rejections of claims 1, 7-9, 120-122, 134, 136-141 and claims 2, 135 (now the subject matter of independent claims 1 and 134, respectively) under 35 U.S.C. §103(a) as being unpatentable over Brezoczky be withdrawn.

In view of the foregoing amendments and discussion,
the application is believed to be in allowable form.
Accordingly, entry of this amendment and favorable
reconsideration and allowance of the claims are most
respectfully requested.

Respectfully submitted,

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